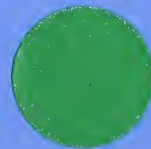


Quick Reference Guide for Clinicians

Acute Pain Management In Adults: Operative Procedures

- Elements of assessing and managing postoperative pain
- Institutional responsibility for managing acute pain
- Sample relaxation exercises and pain assessment tools
- Summary table of scientific evidence to manage pain
- Dosage charts for analgesics



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U.S. Department of Health and Human Services
Public Health Service
Agency for Health Care Policy and Research

Attention clinicians:

This Quick Reference Guide contains excerpts from the *Clinical Practice Guideline for Acute Pain Management: Operative or Medical Procedures and Trauma*, which was developed by an interdisciplinary, non-Federal panel made up of health care practitioners, an ethicist, and a consumer. Panel members were: Daniel B. Carr, MD, (co-chair); Ada K. Jacox, RN, PhD, FAAN (co-chair); C. Richard Chapman, PhD; Betty Ferrell, RN, PhD, FAAN; Howard L. Fields, MD, PhD; George Heidrich III, RN, MA; Nancy O. Hester, RN, PhD; C. Stratton Hill, MD; Arthur G. Lipman, PharmD; Charles L. McGarvey, MS; Christine Miaskowski, RN, PhD; David Stevenson Mulder, MD; Richard Payne, MD; Neil Schechter, MD; Barbara S. Shapiro, MD; Robert Smith, PhD; Carole V. Tsou, MD; and Loretta Vecchiarelli.

For a description of the guideline development process and information about the sponsoring agency (Agency for Health Care Policy and Research), see: Acute Pain Management Guideline Panel. *Acute Pain Management: Operative or Medical Procedures and Trauma. Clinical Practice Guideline*. AHCPR Pub. No. 92-0032. Rockville, MD: Agency for Health Care Policy and Research, Public Health Service, U.S. Department of Health and Human Services. Feb. 1992.

A second guide presents excerpts from the Clinical Practice Guideline on acute pain management in pediatric patients; see: Acute Pain Management Guideline Panel. *Acute Pain Management in Infants, Children, and Adolescents: Operative and Medical Procedures. Quick Reference Guide for Clinicians*. AHCPR Pub. No. 92-0020. Rockville, MD: Agency for Health Care Policy and Research, Public Health Service, U.S. Department of Health and Human Services.

Users should not rely on these excerpts alone but should refer to the complete Clinical Practice Guideline for more detailed analysis and discussion of available research, critical evaluation of the assumptions and knowledge of the field, considerations for patients with special needs (e.g., intercurrent illness or substance abuse), and references. As stated in the Clinical Practice Guideline, decisions to adopt any particular recommendation must be made by the practitioner in light of available resources and circumstances presented by individual patients.

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Acute Pain Management in Adults: Operative Procedures

Introduction

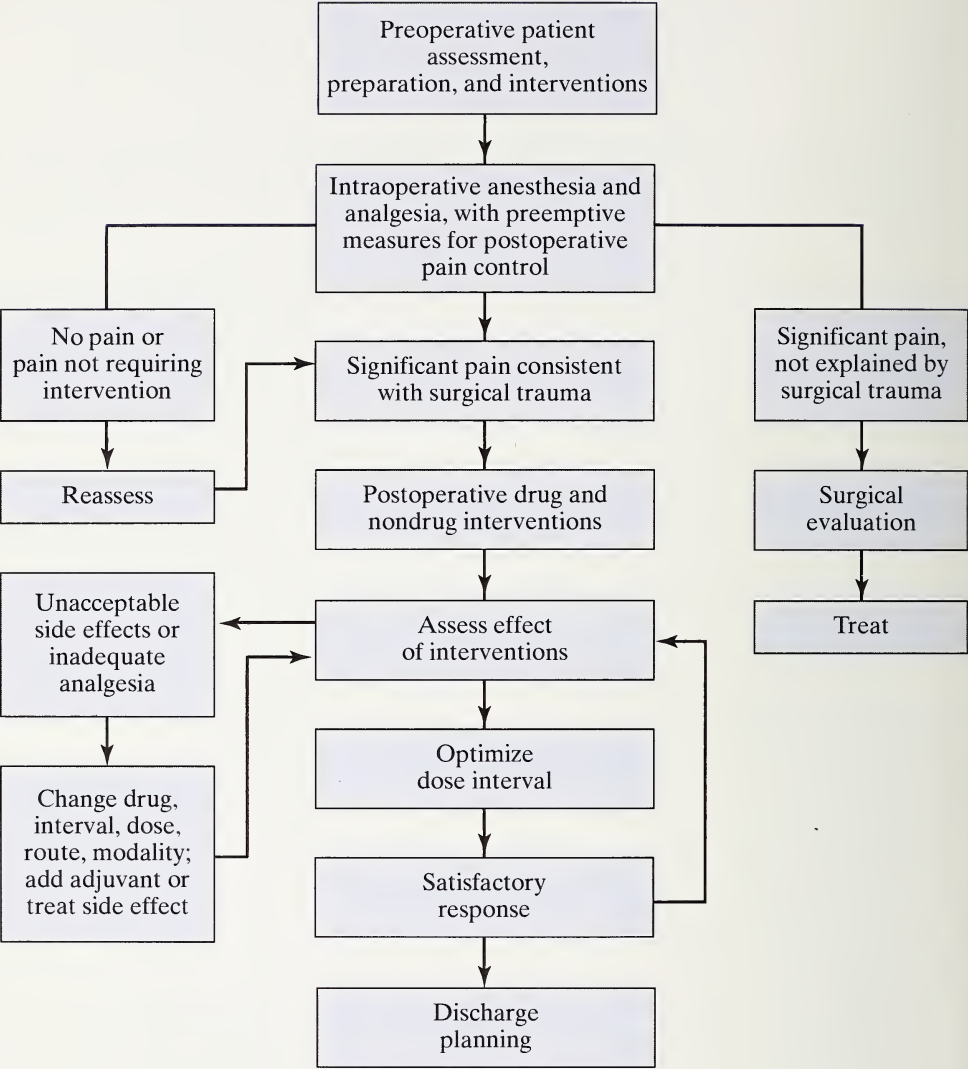
The obligation to manage pain and relieve a patient's suffering is an important part of a health professional's commitment. The importance of pain management is further increased when benefits for the patient are realized—earlier mobilization, shortened hospital stay and reduced costs. Yet clinical surveys continue to show that routine orders for intramuscular injections of opioid “as needed” result in unrelieved pain due to ineffective treatment in roughly half of postoperative patients. Recognition of the inadequacy of traditional pain management has prompted recent corrective efforts from a variety of health care disciplines including surgery, anesthesiology, nursing, and pain management groups. The challenge for clinicians is to balance pain control with concern for patient safety and side effects of pain treatments. This Quick Reference Guide is intended to assist clinicians with these decisions.

Patients vary greatly in their medical conditions and responses to surgery, responses to pain and interventions, and personal preferences. Therefore, rigid prescriptions for the management of postoperative

pain are inappropriate. Several alternative approaches, appropriately and attentively implemented, prevent or relieve pain. This Quick Reference Guide contains excerpts from the *Clinical Practice Guideline for Acute Pain Management: Operative or Medical Procedures and Trauma* and addresses the assessment and management of postoperative pain in adults. The excerpts contained in this Quick Reference Guide provide clinicians with a practical and flexible approach to acute pain assessment and management. However, users should not rely on these excerpts alone but should refer to the complete Clinical Practice Guideline for a more detailed analysis and discussion of the available research, critical evaluation of the assumptions and knowledge of the field, considerations for patients with special needs (e.g. intercurrent medical illness or substance abuse), and references.

The flow chart, which follows, shows the sequence of activities related to pain assessment and management. This Quick Reference Guide provides information about the events listed in the flow chart.

Postoperative Pain Management: A Brief Flow Chart



Effective Management of Postoperative Pain

Requirements

- Pain intensity and relief must be assessed and reassessed at regular intervals.
- Patient preferences must be respected when determining methods to be used for pain management.
- Each institution must develop an organized program to evaluate the effectiveness of pain assessment and management. Without such a program, staff efforts to treat pain may become sporadic and ineffectual.

Principles

- Successful assessment and control of pain depends, in part, on establishing a positive relationship between health care professionals and patients. Patients should be informed that pain

relief is an important part of their health care, that information about options to control pain is available to them, and that they are welcome to discuss their concerns and preferences with the health care team.

- Unrelieved pain has negative physical and psychological consequences. Aggressive pain prevention and control that occurs before, during, and after surgery can yield both short- and long-term benefits.
- It is not practical or desirable to eliminate all postoperative pain, but techniques now available make pain reduction to acceptable levels a realistic goal.
- Prevention is better than treatment. Pain that is established and severe is difficult to control.

Pain Assessment and Reassessment

Principles

- Patients who may have difficulty communicating their pain require particular attention. This includes patients who are cognitively impaired, psychotic or severely emotionally disturbed, children and the elderly, patients who do not speak English, and patients whose level of education or cultural background differs significantly from that of their health care team.
- Unexpected intense pain, particularly if sudden or associated with altered vital signs such as hypotension, tachycardia, or fever, should be immediately evaluated, and new diagnoses such as wound dehiscence, infection, or deep venous thrombosis considered.
- Family members should be involved when appropriate.

Pain Assessment Tools

- The single most reliable indicator of the existence and intensity of pain—and any resultant distress—is the patient's self-report.
- Self-report measurement scales include numerical or adjective

ratings and visual analog scales (see Table 1 for examples).

- Tools should be reliable, valid, and easy for the patient and the nurse or doctor to use. These tools may be used by showing a diagram to the patient and asking the patient to indicate the appropriate rating. The tools may also be used by simply asking the patient for a verbal response (e.g. "On a scale of 0 to 10 with 0 as no pain and 10 as the worst pain possible, how would you rate your pain?").
- Tools must be appropriate for the patient's developmental, physical, emotional, and cognitive status.

Preoperative Preparation

- Discuss the patient's previous experiences with pain and beliefs about and preferences for pain assessment and management.
- Give the patient information about pain management therapies that are available and the rationale underlying their use.

- Develop with the patient a plan for pain assessment and management.
 - Select a pain assessment tool, and teach the patient to use it. Determine the level of pain above which adjustment of analgesia or other interventions will be considered.
 - Provide the patient with education and information about pain control, including training in nonpharmacologic options such as relaxation (see Table 2 for a sample relaxation exercise).
 - Inform patients that it is easier to prevent pain than to chase and reduce it once it has become established and that communication of unrelieved pain is essential to its relief. Emphasize the importance of a factual report of pain, avoiding stoicism or exaggeration.
- used instead of a self-report unless the patient is unable to communicate.
- Assess and reassess pain frequently during the immediate postoperative period. Determine the frequency of assessment based on the operation performed and the severity of the pain. For example, pain should be assessed every 2 hours during the first postoperative day after major surgery.
 - Increase the frequency of assessment and reassessment if the pain is poorly controlled or if interventions are changing.
 - Record the pain intensity and response to intervention in an easily visible and accessible place, such as a bedside flow sheet.
 - Revise the management plan if the pain is poorly controlled.
 - Review with the patient before discharge the interventions used and their efficacy and provide specific discharge instructions regarding pain and its management.

Postoperative Assessment

- Assess the patient's perceptions, along with behavioral and physiologic responses. Remember that observations of behavior and vital signs should not be

Management Options

One or more of these approaches may be used:

- Cognitive-behavioral interventions such as relaxation, distraction, and imagery. These methods may reduce pain and anxiety and control mild pain, but they do not substitute for pharmacologic management of moderate to severe pain.
- Systemic administration of opioids and/or nonsteroidal anti-inflammatory drugs (NSAIDs), including acetaminophen.
- Patient-controlled analgesia (PCA) usually denotes self-medication with intravenous opioids, but may include oral or other routes of administration. PCA offers patients a sense of control over their pain and is preferred by most patients to intermittent injections.
- Spinal analgesia, usually with an epidural opioid and/or local anesthetic injected intermittently or infused continuously.
- Intermittent or continuous local neural blockade, such as intercostal nerve blockade or infusion of local anesthetic through an interpleural catheter.
- Physical agents such as massage or application of heat or cold.
- Transcutaneous electrical nerve stimulation (TENS).

Note: *The use of spinal analgesia or neural blockade or the infusion of local anesthetic through interpleural catheters require special expertise and well-defined institutional protocols and procedures for accountability. The administration of regional analgesia is best limited to specially trained and knowledgeable staff, typically under the direction of an acute or postoperative pain treatment service.*

Pharmacologic Management

- Pharmacologic management of mild to moderate postoperative pain should begin, unless there is a contraindication, with an NSAID. However, moderately severe to severe pain should normally be treated initially with an opioid analgesic, with or without an NSAID.

NSAIDs

- Even when insufficient alone to control pain, NSAIDs, including acetaminophen, have significant opioid dose-sparing effects on postoperative pain and hence can be useful in reducing opioid side effects (see Table 4 for information on prescribing NSAIDs).
- If the patient cannot tolerate oral medication, alternative routes such as rectal administration can be used. At present, one NSAID (ketorolac) is approved by the Food and Drug Administration for parenteral use.

- NSAIDs must be used with care in patients with thrombocytopenia or coagulopathies and in patients who are at risk for bleeding or gastric ulceration. However, acetaminophen does not affect platelet function, and some evidence exists that two salicylates (salsalate and choline magnesium trisalicylate) do not profoundly affect platelet aggregation.

Opioid Analgesics

- Opioid analgesics are the cornerstone for management of moderate to severe acute pain. Effective use of these agents facilitates postoperative activities such as coughing, deep breathing exercises, ambulation, and physical therapy.
- When pain cannot be adequately controlled despite increasing the opioid dose, a prompt search for residual operative pathology is indicated, and other diagnoses such as neuropathic pain should be considered.
- Opioid tolerance and physiologic dependence are unusual in short-term postoperative use in opioid-naïve patients. Likewise, psychologic dependence and addiction are extremely unlikely to develop after the use of opioids for acute pain.

Choice of Opioid Agent

- Morphine is the standard agent for opioid therapy. If morphine cannot be used because of an unusual reaction or allergy,

another opioid such as hydromorphone can be substituted.

- Meperidine should be reserved for very brief courses in patients who have demonstrated allergy or intolerance to other opioids such as morphine and hydromorphone. Meperidine is contraindicated in patients with impaired renal function or those receiving antidepressants that are monoamine oxidase (MAO) inhibitors. Normeperidine is a toxic metabolite of meperidine, and is excreted through the kidney. Normeperidine is a cerebral irritant, and accumulation can cause effects ranging from dysphoria and irritable mood to seizures.

Dosage of Opioid Analgesics

- Patients vary greatly in their analgesic dose requirements and responses to opioid analgesics. The recommended starting doses presented in Table 5 may be inadequate. Subsequent opioid doses must be titrated to increase the amount of analgesia and reduce side effects.
- Relative potency estimates provide a rational basis for selecting the appropriate starting dose, for changing the route of administration (e.g., from parenteral to oral), or for changing from one opioid to another. Equianalgesic doses for opioids are listed in Table 5.
- Patients who have been receiving opioid analgesics before

surgery may require higher starting and maintenance doses postoperatively.

Dosage Schedule

- Opioid administration relying on patients' or families' demands for analgesic prn, or "as needed," produces delays in administration and intervals of inadequate pain control.
- Analgesics should be administered initially on a regular time schedule. For example, if the patient is likely to have pain requiring opioid analgesics for 48 hours after surgery, morphine might be ordered every 4 hours around-the-clock (not prn) for 36 hours. Opioid administration is contraindicated when respiratory depression is present (less than 10 breaths per minute).
- Once the duration of analgesic action is determined, the dosage frequency should be adjusted to prevent pain from recurring.
- Orders may be written so that a patient may refuse an analgesic if not in pain or forego it if asleep. However, since a steady-state blood level is required for the drug to be continuously effective, interruption of an around-the-clock dosage schedule (e.g., during sleep) may cause a resurgence of pain as blood levels of the analgesic decline.
- Late in the postoperative course, it may be acceptable to give opioid analgesics prn. Switching to prn dosing later in the postoperative course provides pain relief while reducing the risk of

adverse effects as the patient's analgesic dose requirement diminishes.

- Clinicians should assess patients at regular intervals to determine the efficacy of the intervention, the presence of side effects, the need for adjustments of dosage and/or interval, or the need for supplemental doses for breakthrough pain.

Route

- Intravenous administration is the parenteral route of choice after major surgery. This route is suitable for bolus administration and continuous infusion (including PCA).
- Repeated intramuscular injections can themselves cause pain and trauma and may deter patients from requesting pain medication. Rectal and sublingual administration are alternatives to intramuscular or subcutaneous routes when intravenous access is problematic. All routes other than intravenous require a lag time for absorption into the circulation.
- Oral administration is convenient and inexpensive. It is appropriate as soon as the patient can tolerate oral intake and is the mainstay of pain management in the ambulatory surgical population.

Nonpharmacologic Management

- Patient teaching should include procedural and sensory information; instruction to decrease

treatment and activity-related pain (e.g., pain caused by deep breathing, coughing) and information about the use of relaxation.

- Cognitive-behavioral (e.g., relaxation, distraction, imagery) and physical interventions (e.g., heat, cold, massage) are intended to supplement, not replace, pharmacologic interventions.
- Cognitive/behavioral interventions include a variety of methods that help patients understand more about their pain and take an active role in pain assessment and management.
- Simple relaxation strategies can be effective in helping to manage pain. Basic approaches (see Table 2 for an example) require only a few minutes to teach and can reduce pain and anxiety. Patients benefit from periodic reinforcement and coaching in the use of relaxation techniques.
- Commonly used physical agents include applications of heat and cold, massage, movement, and rest or immobilization. Applications of heat and cold alter the pain threshold, reduce muscle spasm, and decrease local swelling.
- Transcutaneous electrical nerve stimulation (TENS) may be effective in reducing pain and improving physical function.

Special Considerations for Elderly Persons

The Clinical Practice Guideline contains a more complete discussion of the special considerations for pain management in the elderly. A summary is provided here.

- Elderly people often suffer multiple chronic, painful illnesses and take multiple medications. They are at greater risk for drug-drug and drug-disease interactions.
- Pain assessment presents unique problems in the elderly, as these patients may exhibit physiologic, psychologic, and cultural changes associated with aging.
- Misunderstanding of the relationship between aging and pain is common in the management of elderly patients. Many health care providers and patients alike mistakenly consider pain to be a normal part of aging. Elderly patients sometimes believe that pain cannot be relieved and are stoic in reporting their pain. The frail and oldest-old (> 85 years) are at particular risk for under-treatment of pain.
- Aging need not alter pain thresholds or tolerance. The similarities of pain experience between elderly and younger patients are far more common than are the differences.

- Cognitive impairment, delirium, and dementia are serious barriers to assessing pain in the elderly. Sensory problems such as visual and hearing changes may also interfere with the use of some pain assessment scales. However, as with other patients, the clinician should be able to obtain an accurate self-report of pain from most patients.
- When verbal report is not possible, clinicians should observe for behavioral cues to pain such as restlessness or agitation. The absence of pain behaviors does not negate the presence of pain.
- NSAIDs can be used safely in elderly persons, but their use requires vigilance for side effects, especially gastric and renal toxicity.
- Opioids are safe and effective when used appropriately in elderly patients. Elderly people are more sensitive to analgesic effects of opiate drugs. They experience higher peak effect and longer duration of pain relief.

Institutional Responsibility for Pain Management

The institutional process of acute pain management begins with the affirmation that patients should have access to the best level of pain relief that may safely be provided. (See Table 3 for a summary of the scientific evidence for interventions to manage pain in adults.) Each institution should develop the resources necessary to provide the best and most modern pain relief appropriate to its patients and should designate who and/or which departments are responsible for the required activities.

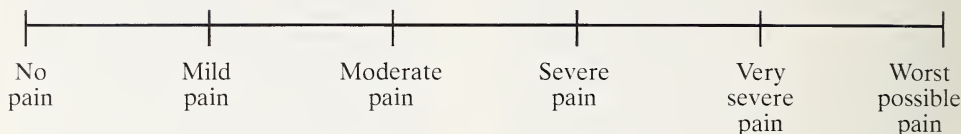
Optimal application of pain control methods depends on cooperation among different members of the health care team throughout the patient's course of treatment. To ensure that this process occurs effectively, formal means must be developed and used within each institution to assess pain management practices and to obtain patient feedback to gauge the adequacy of pain control.

The institution's quality assurance procedures should be used periodically to assure that the following pain management practices are being carried out:

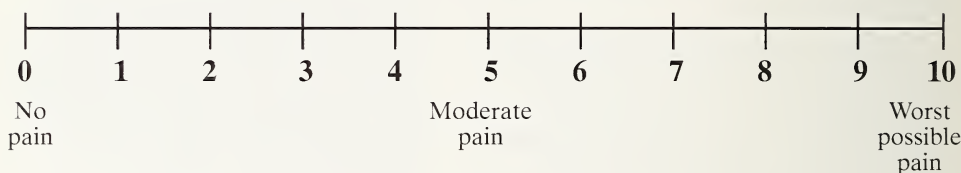
- Patients are informed that effective pain relief is an important part of their treatment, that communication of unrelieved pain is essential, and that health professionals will respond quickly to their reports of pain. They are also told that a total absence of pain is often not a realistic or even a desirable goal.
- Clear documentation of pain assessment and management is provided.
- There are institution-defined levels for pain intensity and relief that elicit review of current pain therapy, documentation of the proposed modifications in treatment, and subsequent review of their efficacy.
- Each clinical unit periodically assesses a randomly selected sample of patients who have had surgery within 72 hours to determine their current pain intensity, the worst pain intensity in the first 24 hours, the degree of relief obtained from pain management interventions, satisfaction with relief, and satisfaction with the staff's responsiveness.

Table 1. Examples of Pain Intensity Scales

Simple Descriptive Pain Intensity Scale¹



0–10 Numeric Pain Intensity Scale¹



Visual Analog Scale (VAS)²



¹If used as a graphic rating scale, a 10 cm baseline is recommended.

²A 10 cm baseline is recommended for VAS scales.

Table 2. Sample Relaxation Exercise

Slow Rhythmic Breathing for Relaxation

1. Breathe in slowly and deeply.
2. As you breathe out slowly, feel yourself beginning to relax; feel the tension leaving your body.
3. Now breathe in and out slowly and regularly, at whatever rate is comfortable for you. You may wish to try abdominal breathing. If you do not know how to do abdominal breathing, ask your nurse for help.
4. To help you focus on your breathing and breathe slowly and rhythmically:
Breathe in as you say silently to yourself, "in, two, three."
Breathe out as you say silently to yourself, "out, two, three."
Each time you breathe out, say silently to yourself a word such as peace or relax.
5. You may imagine that you are doing this in a place you have found very calming and relaxing, such as lying in the sun at the beach.
6. Do steps 1 through 4 only once or repeat steps 3 and 4 for up to 20 minutes.
7. End with a slow deep breath. As you breathe out say to yourself "I feel alert and relaxed."

Additional points:

If you intend to do this for more than a few seconds, try to get in a comfortable position in a quiet environment. You may close your eyes or focus on an object. This technique has the advantage of being very adaptable in that it may be used for only a few seconds or for up to 20 minutes.

Adapted with permission from: McCaffery M. and Beebe A. *Pain: Clinical manual for nursing practice*. St. Louis: C.V. Mosby.

Table 3. Scientific Evidence for Interventions to Manage Pain in Adults

Pharmacologic Interventions

Intervention¹		Type of Evidence	Comments
NSAIDs	Oral (alone)	Ib, IV	Effective for mild to moderate pain. Begin preoperatively. Relatively contraindicated in patients with renal disease and risk of or actual coagulopathy. May mask fever.
	Oral (adjunct to opioid)	Ia, IV	Potentiating effect resulting in opioid sparing. Begin preop. Cautions as above.
	Parenteral (ketorolac)	Ib, IV	Effective for moderate to severe pain. Expensive. Useful where opioids contraindicated, especially to avoid respiratory depression and sedation. Advance to opioid.
Opioids	Oral	IV	As effective as parenteral in appropriate doses. Use as soon as oral medication tolerated. Route of choice.
	Intramuscular	Ib, IV	Has been the standard parenteral route, but injections painful and absorption unreliable. Hence, avoid this route when possible.
	Subcutaneous	Ib, IV	Preferable to intramuscular for low-volume continuous infusion. Injections painful and absorption unreliable. Avoid this route for long-term repetitive dosing.
	Intravenous	Ib, IV	Parenteral route of choice after major surgery. Suitable for titrated bolus or continuous administration (including PCA), but requires monitoring. Significant risk of respiratory depression with inappropriate dosing.
	PCA (systemic)	Ia, IV	Intravenous or subcutaneous routes recommended. Good, steady level of analgesia. Popular with patients but requires special infusion pumps and staff education. See cautions about opioids above.
	Epidural and intrathecal	Ia, IV	When suitable, provides good analgesia. Significant risk of respiratory depression, sometimes delayed in onset. Requires careful monitoring. Use of infusion pumps requires additional equipment and staff education.
Local Anesthetics	Epidural and intrathecal	Ia, IV	Limited indications. Expensive if infusion pumps employed. Effective regional analgesia. Opioid sparing. Addition of opioid to local anesthetic may improve analgesia. Risks of hypotension, weakness, numbness. Use of infusion pump requires additional equipment and staff.
	Peripheral nerve block	Ia, IV	Limited indications and duration of action. Effective regional analgesia. Opioid sparing.

Nonpharmacologic Interventions

Intervention ¹		Type of Evidence	Comments
Simple Relaxation (begin preoperatively)	Jaw relaxation	Ia, IIa, IIb, IV	Effective in reducing mild to moderate pain and as an adjunct to analgesic drugs for severe pain. Use when patients express an interest in relaxation. Requires 3–5 minutes of staff time for instructions.
	Progressive muscle relaxation		
	Simple imagery		
	Music	Ib, IIa, IV	Both patient-preferred and “easy listening” music are effective in reducing mild to moderate pain.
Complex Relaxation (begin preoperatively)	Biofeedback	Ib, IIa, IV	Effective in reducing mild to moderate pain and operative site muscle tension. Requires skilled personnel and special equipment.
	Imagery	Ib, IIa, IIb, IV	Effective for reduction of mild to moderate pain. Requires skilled personnel.
Education/Instruction (begin preoperatively)		Ia, IIa, IIb, IV	Effective for reduction of pain. Should include sensory and procedural information and instruction aimed at reducing activity related pain. Requires 5–15 minutes of staff time.
TENS		Ia, IIa, III, IV	Effective in reducing pain and improving physical function. Requires skilled personnel and special equipment. May be useful as an adjunct to drug therapy.

¹ Insufficient scientific evidence is available to provide specific recommendations regarding the use of hypnosis, acupuncture, and other physical modalities for relief of postoperative pain.

Type of Evidence – Key

- Ia Evidence obtained from meta-analysis of randomized controlled trials.
- Ib Evidence obtained from at least one randomized controlled trial.
- IIa Evidence obtained from at least one well-designed controlled study without randomization.
- IIb Evidence obtained from at least one other type of well-designed quasi-experimental study.
- III Evidence obtained from well-designed nonexperimental descriptive studies, such as comparative studies, correlational studies, and case studies.
- IV Evidence obtained from expert committee reports or opinions and/or clinical experiences of respected authorities.

Note: References are available in the *Guideline Report. Acute Pain Management: Operative or Medical Procedures and Trauma*. AHCPR Pub. No. 92–0001. Rockville, MD: Agency for Health Care Policy and Research, Public Health Service, U.S. Department of Health and Human Services. In press.

Table 4. Dosing Data for NSAIDs

Drug	Usual adult dose	Usual pediatric dose¹	Comments
Oral NSAIDs			
Acetaminophen	650–975 mg q 4 hr	10–15 mg/kg q 4 hr	Acetaminophen lacks the peripheral anti-inflammatory activity of other NSAIDs
Aspirin	650–975 mg q 4 hr	10–15 mg/kg q 4 hr ²	The standard against which other NSAIDs are compared. Inhibits platelet aggregation; may cause postoperative bleeding
Choline magnesium trisalicylate (Trilisate)	1000–1500 mg bid	25 mg/kg bid	May have minimal antiplatelet activity; also available as oral liquid
Diflunisal (Dolobid)	1000 mg initial dose followed by 500 mg q 12 hr		
Etodolac (Lodine)	200–400 mg q 6–8 hr		
Fenoprofen calcium (Nalfon)	200 mg q 4–6 hr		
Ibuprofen (Motrin, others)	400 mg q 4–6 hr	10 mg/kg q 6–8 hr	Available as several brand names and as generic; also available as oral suspension
Ketoprofen (Orudis)	25–75 mg q 6–8 hr		
Magnesium salicylate	650 mg q 4 hr		Many brands and generic forms available

Drug	Usual adult dose	Usual pediatric dose ¹	Comments
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Oral NSAIDs

Meclofenamate sodium (Meclomen)	50 mg q 4–6 hr		
Mefenamic acid (Ponstel)	250 mg q 6 hr		
Naproxen (Naprosyn)	500 mg initial dose followed by 250 mg q 6–8 hr	5 mg/kg q 12 hr	Also available as oral liquid
Naproxen sodium (Anaprox)	550 mg initial dose followed by 275 mg q 6–8 hr		
Salsalate (Disalcid, others)	500 mg q 4 hr		May have minimal antiplatelet activity
Sodium salicylate	325–650 mg q 3–4 hr		Available in generic form from several distributors

Parenteral NSAID

Ketorolac tromethamine (Toradol)	30 or 60 mg IM initial dose followed by 15 or 30 mg q 6 hr Oral dose following IM dosage: 10 mg q 6–8 hr		Intramuscular dose not to exceed 5 days
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Note: Only the above NSAIDs have FDA approval for use as simple analgesics, but clinical experience has been gained with other drugs as well.

¹Drug recommendations are limited to NSAIDs where pediatric dosing experience is available.

²Contraindicated in presence of fever or other evidence of viral illness.

Table 5. Dosing Data for Opioid Analgesics

Drug	Approximate equianalgesic oral dose	Approximate equianalgesic parenteral dose
Opioid Agonist		
Morphine ²	30 mg q 3–4 hr (around-the-clock dosing)	10 mg q 3–4 hr
	60 mg q 3–4 hr (single dose or intermittent dosing)	
Codeine ³	130 mg q 3–4 hr	75 mg q 3–4 hr
Hydromorphone ² (Dilaudid)	7.5 mg q 3–4 hr	1.5 mg q 3–4 hr
Hydrocodone (in Lorcet, Lortab, Vicodin, others)	30 mg q 3–4 hr	Not available
Levorphanol (Levo-Dromoran)	4 mg q 6–8 hr	2 mg q 6–8 hr
Meperidine (Demerol)	300 mg q 2–3 hr	100 mg q 3 hr
Methadone (Dolophine, others)	20 mg q 6–8 hr	10 mg q 6–8 hr
Oxycodone (Roxicodone, also in Percocet, Percodan, Tylox, others)	30 mg q 3–4 hr	Not available
Oxymorphone ² (Numorphan)	Not available	1 mg q 3–4 hr
Opioid Agonist-Antagonist and Partial Agonist		
Buprenorphine (Buprenex)	Not available	0.3–0.4 mg q 6–8 hr
Butorphanol (Stadol)	Not available	2 mg q 3–4 hr
Nalbuphine (Nubain)	Not available	10 mg q 3–4 hr
Pentazocine (Talwin, others)	150 mg q 3–4 hr	60 mg q 3–4 hr

Note: Published tables vary in the suggested doses that are equianalgesic to morphine. Clinical response is the criterion that must be applied for each patient; titration to clinical response is necessary. Because there is not complete cross tolerance among these drugs, it is usually necessary to use a lower than equianalgesic dose when changing drugs and to retitrate to response.

Caution: recommended doses do not apply to patients with renal or hepatic insufficiency or other conditions affecting drug metabolism and kinetics.

¹**Caution:** Doses listed for patients with body weight less than 50 kg cannot be used as initial starting doses in babies less than 6 months of age. Consult the *Clinical Practice Guideline for Acute Pain Management: Operative or Medical Procedures and Trauma* section on management of pain in neonates for recommendations.

**Recommended starting dose
(adults more than 50 kg body weight)
oral**

**Recommended starting dose
(children and adults less than 50 kg body weight)¹
oral**

Recommended starting dose (adults more than 50 kg body weight) oral		Recommended starting dose (children and adults less than 50 kg body weight)¹ oral	
30 mg q 3–4 hr	10 mg q 3–4 hr	0.3 mg/kg q 3–4 hr	0.1 mg/kg q 3–4 hr
60 mg q 3–4 hr	60 mg q 2 hr (intramuscular/ subcutaneous)	1 mg/kg q 3–4 hr ⁴	Not recommended
6 mg q 3–4 hr	1.5 mg q 3–4 hr	0.06 mg/kg q 3–4 hr	0.015 mg/kg q 3–4 hr
10 mg q 3–4 hr	Not available	0.2 mg/kg q 3–4 hr ⁴	Not available
4 mg q 6–8 hr	2 mg q 6–8 hr	0.04 mg/kg q 6–8 hr	0.02 mg/kg q 6–8 hr
Not recommended	100 mg q 3 hr	Not recommended	0.75 mg/kg q 2–3 hr
20 mg q 6–8 hr	10 mg q 6–8 hr	0.2 mg/kg q 6–8 hr	0.1 mg/kg q 6–8 hr
10 mg q 3–4 hr	Not available	0.2 mg/kg q 3–4 hr ⁴	Not available
Not available	1 mg q 3–4 hr	Not recommended	Not recommended
Not available	0.4 mg q 6–8 hr	Not available	0.004 mg/kg q 6–8 hr
Not available	2 mg q 3–4 hr	Not available	Not recommended
Not available	10 mg q 3–4 hr	Not available	0.1 mg/kg q 3–4 hr
50 mg q 4–6 hr	Not recommended	Not recommended	Not recommended

²For morphine, hydromorphone, and oxymorphone, rectal administration is an alternate route for patients unable to take oral medications, but equianalgesic doses may differ from oral and parenteral doses because of pharmacokinetic differences.

³**Caution:** Codeine doses above 65 mg often are not appropriate due to diminishing incremental analgesia with increasing doses but continually increasing constipation and other side effects.

⁴**Caution:** Doses of aspirin and acetaminophen in combination opioid/NSAID preparations must also be adjusted to the patient's body weight.

Acute Pain Management in Adults: Operative Procedures—Selected Bibliography

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